

May 1, 1953

Dear Dr. Alexander:

Thank you for the reprints, and especially for the last which I read with the deepest interest. These are remarkable findings indeed.

At first, I was not sure, but I now suspect that we have much the same viewpoint on the relationships of transformations or transductions to sexual processes. There is a striking similarity between the Hemophilus and the Salmonella results, excepting only that the active material (what I should like to regard as chromosome fragments) is susceptible to chemical analysis in the former, and buried within a phage particle in the latter. We have several instances of transduction leading to unstable intermediate types, which subsequently segregate out into the parental forms. As in your material, however, these intermediate forms have acquired only a single determinant from the "TP". It would be interesting to see what would happen in Hemophilus with a streptomycin-resistant recipient and a sensitive donor, i.e., S^R a $--x S^r$ Sb. I venture to predict that the resulting Sab types will continue to be streptomycin resistant (barring coincidences at calculable frequencies). The experiment should be done with S^R/S^S reversed as well, of course, but this order was suggested on the expectation that S^r would be recessive to S^S .

The most distinctive feature of the E. coli K-12 recombination system is that the simultaneous reassortment of numerous distinct characters is the rule, and as a corollary to this, the intermediate diploids that have been obtained are generally segregating for nearly all of the many distinct factors of the parents. [There are some complicating exceptions, covered by "nearly all" of the previous phrase, and we have quite a few diploids which are completely heterozygous, for as many as 10 markers.] It is an important feature of their behavior that segregation occurs all at once for all of the markers. For this reason, we have no doubt that we are dealing with a hybrid containing two sets of organized factors. Whatever the morphological basis, and here there is only the negative evidence that intact cells seem to be required, the K-12 system seems to involve the transfer of the entire genetic structure (or at worst the larger part of it), while the Hemophilus, pneumococcus, and Salmonella can and do transmit only bits and fragments. Thus the genetic and physical findings are in good agreement. The genetic consequences of recombination in K-12 are identical with those of typical sexual systems. This is true also for transductive systems, one (or occasionally pairs) factor at a time, and on this basis the latter may well be considered as a circumscribed form of sexual fertilization. I take it that this is essentially your own view, expressed somewhat differently perhaps.

Yours cordially,